October 17, 2002

RE: Bethlehem Steel Corporation 127-15656-00001

TO: Interested Parties / Applicant

FROM: Paul Dubenetzky

Chief, Permits Branch Office of Air Quality

## **Notice of Decision: Approval - Effective Immediately**

Please be advised that on behalf of the Commissioner of the Department of Environmental Management, I have issued a decision regarding the enclosed matter. Pursuant to IC 13-15-5-3, this permit is effective immediately, unless a petition for stay of effectiveness is filed and granted according to IC 13-15-6-3, and may be revoked or modified in accordance with the provisions of IC 13-15-7-1.

If you wish to challenge this decision, IC 4-21.5-3 and IC 13-15-6-1 require that you file a petition for administrative review. This petition may include a request for stay of effectiveness and must be submitted to the Office of Environmental Adjudication, ISTA Building, 150 W. Market Street, Suite 618, Indianapolis, IN 46204, within (18) eighteen days of the mailing of this notice. The filing of a petition for administrative review is complete on the earliest of the following dates that apply to the filing:

- (1) the date the document is delivered to the Office of Environmental Adjudication (OEA);
- (2) the date of the postmark on the envelope containing the document, if the document is mailed to OEA by U.S. mail; or
- (3) the date on which the document is deposited with a private carrier, as shown by receipt issued by the carrier, if the document is sent to the OEA by private carrier.

The petition must include facts demonstrating that you are either the applicant, a person aggrieved or adversely affected by the decision or otherwise entitled to review by law. Please identify the permit, decision, or other order for which you seek review by permit number, name of the applicant, location, date of this notice and all of the following:

- (1) the name and address of the person making the request;
- (2) the interest of the person making the request;
- (3) identification of any persons represented by the person making the request;
- (4) the reasons, with particularity, for the request;
- (5) the issues, with particularity, proposed for consideration at any hearing; and
- (6) identification of the terms and conditions which, in the judgment of the person making the request, would be appropriate in the case in question to satisfy the requirements of the law governing documents of the type issued by the Commissioner.

If you have technical questions regarding the enclosed documents, please contact the Office of Air Quality, Permits Branch at (317) 233-0178. Callers from within Indiana may call toll-free at 1-800-451-6027, ext. 3-0178.



### Indiana Department of Environmental Management

We make Indiana a cleaner, healthier place to live.

Frank O'Bannon Governor

Lori F. Kaplan Commissioner 100 North Senate Avenue P.O. Box 6015 Indianapolis, Indiana 46206-6015 (317) 232-8603 (800) 451-6027 www.in.gov/idem

October 17, 2002

Robert Maciel Bethlehem Steel Corporation P.O.Box 248 Chesterton, Indiana 46304

Re: 127-15656

Significant Modification to CP 127-2725-00001

#### Dear Robert Maciel:

Bethlehem Steel Corporation was issued a construction permit CP127-2725-00001 on January 28, 1994 relating to the operation of the vacuum degasser unit. A request to allow relaxation of the steel production limit for the vacuum degasser unit in the operation condition 12 was received on July2, 2002. Pursuant to IC13-15-7-1, this condition in the construction permit CP127-2725-00001 is hereby modified as follows:

12. That the vacuum degasser shall not remove more than 0.04% carbon from the steel based on a twelve month period rolled on monthly basis and the production level shall be limited to not exceed an average of 490,071 pounds per hour and 2,146,511 tons of hot steel, both based on a twelve month period rolled on a monthly basis and shall supercede the original condition 5b in PC 64-1788. This limit is equivalent to 64.8 tons per year of CO emissions.

A new condition 12a, is added as follows:

12a. The Coke Battery #2 shall generate and supply to the steel manufacturing plant at least 1,793,385,000 cubic feet of coke oven gas based on a twelve month period rolled on a monthly basis, excluding any hours when the Coke Battery #2 is not in operation. The Permittee shall maintain records on quarterly basis to show compliance with this condition.

All other conditions of the permit shall remain unchanged and in effect. Please attach a copy of this modification to the front of the original permit CP 127-2725-00001.

In addition on July 22, 2002, IDEM, OAQ received a request from the Bethlehem Steel Corporation to change the responsible official from Thomas W. Easterly to Robert Maciel, Superintendent, Environmental Services Department. By this letter the IDEM, OAQ acknowledges this change and has implemented the same in its database and communications to the source.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter, please contact Gurinder Saini, at (800) 451-6027, press 0 and ask for Gurinder Saini or extension 3-0203, or dial (317) 233-0203.

Sincerely,

Original Signed by Paul Dubenetzky Paul Dubenetzky, Chief Permits Branch Office of Air Quality

GS

cc: File – Porter County
U.S. EPA, Region V
Porter County Health Department
Northwest Regional Office
Air Compliance Section Inspector – David Sampias
Compliance Data Section - Karen Nowak
Administrative and Development – Sara Cloe
Technical Support and Modeling - Michele Boner
Part 70 Operating Permit file – T 127-6301-00001
Part 70 Operating Permit Reviewer – Melissa Groch

# Indiana Department of Environmental Management Office of Air Quality

Technical Support Document (TSD) for a Significant Modification to a Construction Permit

#### **Source Background and Description**

Source Name: Bethlehem Steel Corporation

Source Location: U.S. Highway 12, Burns Harbor, IN 46304

County: Porter SIC Code: 3312

Construction Permit No.: 127-2725-00001
Permit Issuance Date: January 28, 1994
Significant Modification No.: 127-15656-00001
Permit Reviewer: Gurinder Saini

The Office of Air Quality (OAQ) has reviewed a modification request from Bethlehem Steel Corporation relating to the operation of the vacuum degasser unit, which was permitted under permit CP-127-2725-00001. This modification request consists of the following items:

Modify operation condition 12 of the Construction Permit 127-2725-00001 issued on January 28, 1994, to allow increased production of degassed steel using the existing vacuum degasser unit. The degassed steel production was limited based on a netting evaluation and calculation performed in order for the installation of the Coke Oven Battery #2, to retain the minor status under PSD and Emissions Offsets. The following items are considered for this change:

- (1) The emissions from the increased production of the coke oven gas were included in the netting calculations, but no credit was accounted for in the reduction in use of natural gas as a result of the use of coke oven gas at the plant.
- (2) The netting calculation also included emissions resulting from the increased steam generator usage for the operation of the vacuum degasser unit. This increase in steam production was never needed or will never be needed in the future because the plant has sufficient quantity of steam available for use at the vacuum degasser.
- (3) The net emissions increase for CO from the renovation of Coke Battery #2 project was at 93.8 tons per year. Therefore, an additional 6.1 tons per year of CO emissions can be allowed from the vacuum degasser unit without making the modification major.
- (4) The carbon removal percentage from the molten steel by the vacuum degasser is to be changed to 0.04% from 0.03% as originally permitted.

#### **History**

Bethlehem Steel Corporation was issued a Construction Permit PC (64) 1788 on February 14, 1990 for the construction and operation of a "vacuum degasser process equipped with a carbon monoxide flare, baghouse controlled alloy addition material handling system, refractory drying and

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Bethlehem Steel Corporation Chesterton, Indiana Permit Reviewer: GS

preheating burners." The condition 5 in this permit pertains to the operation of the vacuum degasser. The item b) in this condition limits the maximum steel production from the vacuum degasser unit to 750,000 pounds per hour. This limits the annual production to 3,285,000 tons of steel per year. The item e) in the same condition limits the CO emissions from this unit to 15.75 pounds per hour and 69 tons per year.

On January 28, 1994 a Construction Permit CP 127-2725-00001 was issued to Bethlehem Steel for the reconstruction of the Coke Battery No.2. The TSD for this permit documents the CO emissions increase after the reconstruction of this Coke Battery to be at 122 tons per year. The decrease in the CO emissions (emissions in the year 1989 and 1990) was shown to be 103 tons per year. Therefore, the net emissions increase for CO was 19 (122-103) tons per year.

The U.S. EPA, Region 5 in a letter on May 28, 1993 commented on this permit that "..regulations require netting calculations to include all net emissions increases and decreases occurring <u>source wide</u> (at the entire mill) in the five years prior to the commencement of construction... the coke oven battery permit only counts the emissions increases and decreases resulting from the proposed modification (the rebuilding of the unit)."

In the addendum to the TSD issued for the final Construction Permit CP 127-2725-00001, the IDEM, OAQ performed additional review of all the emission increases and decreases for the last five years. In addition Bethlehem Steel in a letter dated June 14, 1993 responding to the comments made by the U.S.EPA, identified additional CO emissions from the combustion of coke oven gas. The reconstructed Coke Battery No.2 was expected to produce additional 1,793,385,000 cubic feet of coke oven gas per year. This gas was to be used at various units (other than the coke oven battery itself) in place of using the natural gas. Bethlehem Steel calculated the following additional CO emissions from this coke oven gas use:

= 19.37 tons per year of CO emissions

Therefore, the CO emissions increase from the reconstruction of the Coke Battery No.2 were as follows:

Potential to emit of CO emissions after reconstruction = + 122 tons per year
Actual CO emissions before reconstruction = - 103 tons per year
Additional CO emissions from combustion of coke oven gas = +19.37 tons per year

CO emissions increase from the reconstruction = +38.37 tons per year

In a letter dated October 18, 1993, Bethlehem Steel detailed the contemporaneous increases and decreases at the source in accordance with the U.S.EPA comment. The net emissions increase after taking into account the increases and decreases were major for CO emissions. Therefore, the Permittee accepted a limitation of 39.8 tons per year on the allowable CO emissions from the Vacuum Degasser. The Permittee included a detailed 5 year netting table as an attachment to this letter. This table is shown below:

Table –1: Five year netting at Bethlehem Steel, Burns Harbor

Date	Emission Unit	TSP/PM	PM10	SO2	VOC	CO	NOx
2/14/1990	Vacuum Degasser	9.1	5	0.5	0.5	39.8	10
2/14/1992	Hot Dip Coating line	9.8	9.8	0.24	1.1	14	11.4
11/12/1992	Hot Metal Desufurization Station No.3	1.1	1.1	0	0	0	0
8/91	Benzene NESHAP "L" Controls	0	0	0	-1032	0	0
8/4/1993	Blast Furnace Coal Injection	13.6	13.2	0.13	0.6	7.48	30
Future	Coke Oven Battery No.2 Renovation	18.8	3.1	-2878	2.4	38.3	-17.4
11/15/1993	Coke Battery 1 Emission Reductions	-12.69	-10.46	0	-23.17	-5.79	0
Summer 93	Paving Slab Hauler Roads	-238.4	-175.3	0	0	0	0
Total		-198.69	-153.56	-2877.13	-1050.57	93.79	34
Significant Emission Levels		25	15	40	40	100	40

The operation condition 12 in the construction permit CP 127-2725-00001 limits the hot (degassed) steel production to 342,465 pounds per hour and 1,500,000 tons on a 12 month period rolled on a monthly basis. This condition superceded the operation condition 5b in the construction permit PC (64) 1788.

#### **Explanation of Modification**

The Permittee in a letter dated June 7, 2002 to the IDEM, OAQ requested the relaxation of the steel production limit for the vacuum degasser in the construction permit 127-2725-00001. The Permittee identified the following factors in support of the relaxation of the steel production limit:

#### 1. Reduction credit for substitution of Natural Gas with Coke Oven gas

As stated earlier the Permittee calculated a 19.37 tons per year CO emissions increase from the combustion of Coke Oven gas at various units in the plant other than the Coke Battery itself. These units previously used natural gas as fuel prior to this modification. Due to the excess Coke Oven gas production, it was envisioned that the coke oven gas would replace natural gas as the preferred fuel alternative at this Source. The coke oven gas production available to be used at the processes throughout the plant was 1,793,385,000 cubic feet per year. Assuming a coke oven gas (COG) heating value of 540 Btu/cubic feet and natural gas (NG) heating value of 1025 Btu/cubic feet, the following heating value ratio is calculated:

Heat value ratio of NG/COG = 1025/540 = 1.9

Amount of NG that would be replaced by COG at various units at the Source is:

1,793,385,000 cubic feet of COG / 1.9 = 943,886,842 cubic feet of NG

Reduction in CO emissions due to replacement of NG as fuel:

$$\frac{943,886,842 \text{ SCF of NG}}{\text{year}}$$
 X  $\frac{40 \text{ lb}}{1 \text{ X } 10^6 \text{ SCF}}$  X  $\frac{0.0005 \text{ lb}}{\text{ton}}$  = 18.8 tons per year

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The 40 lb/MMSCF emission factor for CO emissions from the NG combustion is based on old data available in previous editions of the AP–42 Compilation of Air Pollutant Emission Factors, Chapter 1.4. The latest version (July 98) of this chapter shows the CO emission factor for the NG to be as high as 84 lb/MMSCF. In this set of calculations IDEM, OAQ used the old emission factor because it conservatively estimates CO emissions at levels less than half the present factor and this factor was used for calculations throughout the permits PC (68) 1788 and CP 127-2725-00001. This in turn is protective of the environment and allows lower credit for emission reduction to the Permittee.

In support of this factor, the Permittee has presented the following information showing the reductions in plant wide CO emissions due to the decrease in natural gas usage.

Table – 2: Change in CO emissions from reduction in NG use at Bethlehem Steel Plant

1990	1995-2001	Change	
27.6 Million MMBtu/year	20.1 Million MMBtu/year	-7.5 Million MMBtu/year	
Reduction in CO emissions	-146.3 tons/year		
usage			

Based on above discussion, there is a decrease of 18.8 tons per year of CO emissions by using additional coke oven gas at various units in the plant in place of natural gas. The Permittee has requested that this decrease be assigned as credit to the vacuum degasser to allow a higher limit for steel production.

2. Credit for unused CO emissions portion for not generating additional steam In a letter dated November 17, 1989, the Permittee detailed the potential to emit calculation for CO emissions from the modification to add the vacuum degasser in the permit PC (64) 1788. The Permittee used the design carbon removal rate of 0.03%. As a worst case all this carbon is expected to be converted to carbon monoxide. These calculations are as follows:

#### Calculated Annual Process Emission Rate

Vacuum degasser steel production rate = 750,000 pounds/hour

Uncontrolled CO emission rate

= 525 lb uncontrolled CO/hour

This is distributed as follows:

CO from process vacuum system (approximately 95% of total) = 498.7 lb CO/hour

CO from scrubber system (approximately 5% of total) = 26.3 lb CO/hour

Emissions from the process vacuum and scrubber are sent to stack flare for CO control. Therefore the controlled emission rate from the process stack flare using 97% efficiency of control is calculated as follows:

Process vacuum system

$$\frac{498.7 \text{ lb CO}}{\text{hour}} \times \frac{\text{X } 8,760 \text{ hour}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times (1 - 0.97) = 65.5 \frac{\text{tons of controlled CO}}{\text{year}}$$

Recycled water scrubber system

Total CO emissions from the stack flare = 65.5 + 3.5 = 69 tons per year.

#### Combustion Emissions Steam Generation emissions

Operation of the vacuum degasser is accomplished using available plant steam. However, the worst case scenario is that additional natural gas would be purchased in order to generate additional steam. As shown in the construction permit application, the maximum load on the power station in this event would be about 130 MMBtu per hour heat input per hour of degasser operation.

From EPA publication AP-42, the carbon monoxide emission factor for natural gas combustion is 40 pounds of CO per 1,000,000 cubic feet of natural gas. Based on the above, the worst case calculated emission rate is as follows:

$$\frac{0.079 \times 10^6 \text{ cubic foot}}{\text{hour}} \times \frac{8,760 \text{ hr}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \times \frac{40 \text{ lb CO}}{106 \text{ cubic foot}} = \frac{13.8 \text{ tons CO}}{\text{year}}$$

Further the Permittee calculated 3.5 tons per year of CO emission from refractory drying and preheating and 0.9 tons per year CO emission from process stack flare pilot burner. As these two items remain unchanged, therefore, these are not detailed here.

Therefore, the total CO emissions in construction permit PC (64) 1788 issued on February 14, 1990 are:

$$69 + 13.8 + 0.9 + 3.5 = 87.2$$
 tons per year.

This CO emission rate was based on 750,000 pounds of steel per hour and 3,285,000 tons of steel per year.

As described earlier, in the October 18, 1993 letter, the Permittee agreed to limit the annual steel production to 1,500,000 tons of steel per year. Based on this limitation the Permittee calculated the new CO emission rate as follows:

$$3,285,000$$
 tons of steel per year = 2.19 1,500,000 tons of steel per year

This CO emission rate of 39.8 tons per year was used in the five year netting table shown as Table 1 earlier.

This calculation of CO emissions is erroneous because it reduces emissions from refractory drying and preheating and stack flare pilot in the ratio of the limit on the steel production. Further, the Permittee has stated in the June 7, 2002 request that the additional steam production was never needed and will not be required in the future as the plant has sufficient steam generation capacity and waste steam available for the operation of the vacuum degasser. Therefore, this CO emission credit should be applied to the vacuum degasser to relax the CO emission limit. The revised CO emission calculations are shown in the following pages that show the corrected CO emissions from the vacuum degasser unit.

# 3. Increasing the CO emissions for five years to less than 100 tons per year in place of 93.8 tons per year shown in table 1

The Permittee is allowed to increase the CO emissions from the vacuum degasser such that the net emissions increase taking into account the contemporaneous increases and decreases from the renovation of coke battery #2 modification is less than 100 tons per year. This is the significance threshold for the CO emissions for a PSD major modification. Thus to maintain the minor status of the coke battery #2 modification the CO net emissions increase for the contemporaneous period shall be limited to less than 100 tons per year. Pollutants other than NOx and CO in table 1 have large negative net emissions. Therefore they are not considered further in this discussion.

#### Changes to the Netting Calculations for the No.2 Coke Battery Renovation project

Table 1 is revised for NOx and CO emission credits for vacuum degasser and is shown as Table 2 below (the old values are shown with strikeout and new are shown with bold):

Table –2: Five year netting at Bethlehem Steel, Burns Harbor

Date	Emission Unit	CO	NOx
2/14/1990	Vacuum Degasser	<del>39.8</del>	<del>10</del>
		<64.8	<16
2/14/1992	Hot Dip Coating line	14	11.4
11/12/1992	Hot Metal	0	0
	Desufurization Station No.3		
8/91	Benzene NESHAP "L" Controls	0	0
8/4/1993	Blast Furnace Coal Injection	7.48	30
Future	Coke Oven Battery No.2 Renovation	38.3	-17.4
1994	Reduction in CO	-18.8	
onwards	emissions due to use		
	of coke oven gas in		
	place of natural gas		
11/15/1993	Coke Battery 1	-5.79	0
	Emission Reductions		
Summer 93	Paving Slab Hauler	0	0
	Roads		
Total		<del>93.79</del>	34
		<100	<40
Significant E	100	40	

Based on above table the CO and NOx emissions from the vacuum degasser project as permitted in PC (64) 1788 should be limited to less than 64.8 and 16 tons per year respectively to maintain the PSD minor status of the Coke Battery #2 renovation modification.

#### Calculation of Steel Production rate based on CO emissions

Limited CO emissions from the entire vacuum degasser modification < 64.8 tons per year.

Subtract the CO emissions from the Refractory Drying and Preheating and Stack flare pilot.

<64.8 tons per year 
$$-3.5$$
 tons per year  $-0.9$  tons per year  $=<60.1$  tons per year

Therefore, the CO emissions from the vacuum degasser operation shall be limited to less than 60.1 tons per year. Also the carbon removal efficiency by the vacuum degasser is revised to 0.04% from 0.03%. This is converted to hourly steel production limit as follows using the stack flare control efficiency of 97%:

Convert this amount to annual steel production as follows:

There is no change in NOx emissions due to the increased operation of the vacuum degasser as the operation does not produce any NOx. The major contribution to the NOx emissions in the PC (64) 1788 modification for the vacuum degasser was 21.51 tons per year from the need to generate excess steam at the boiler house for the operation of the vacuum degasser. As this steam generation was never implemented the potential to emit for NOx will be below the allowable of 16 tons per year for the vacuum degasser modification.

#### **Justification for the Modification**

The Construction Permit is being modified through a significant modification because an emission limitation in the original permit is relaxed. This modification is being performed pursuant to IC 13-15-7-1.

This modification request is not subject to 40 CFR 52.21 (r) (4), even though this modification relaxes an enforceable limitation, which was established after August 7, 1980, on the capacity of the vacuum degasser, since the net CO emissions increase from the renovation of coke battery #2 modification is less than "significance" levels for that pollutant.

This modification involves relaxing emission limits in an issued permit. Therefore, this modification will be subject to public notice and 30 day public comment period.

#### **Permit Changes**

The following permit conditions are modified as follows (language deleted is shown in strikeout and added is shown in **bold**):

Construction Permit CP-127-2725-00001 issued on January 28, 1994

Operation condition 12.

Bethlehem Steel Corporation Chesterton, Indiana Permit Reviewer: GS

12. That the vacuum degasser shall not remove more than 0.04% carbon from the steel based on a twelve month period rolled on monthly basis and the production level shall be limited to not exceed an average of 342, 465 490,071 pounds per hour and 1,500,000 2,146,511 tons of hot steel, both based on a twelve month period rolled on a monthly basis and shall supercede the original condition 5b in PC 64-1788. This limit is equivalent to 64.8 tons per year of CO emissions.

A new condition 12a, is added as follows:

12a. The Coke Battery #2 shall generate and supply to the steel manufacturing plant at least 1,793,385,000 cubic feet of coke oven gas based on a twelve month period rolled on a monthly basis, excluding any hours when the Coke Battery #2 is not in operation. The Permittee shall maintain records on quarterly basis to show compliance with this condition.

#### Recommendation

The staff recommends to the Commissioner that the significant modification be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the modification request submitted by the applicant.

An application for the purposes of this review was received on July 2, 2002. Additional information was received on June 7, 2002 and May 22, 2002.

#### Conclusion

This permit modification shall be subject to the conditions of the attached Modified Construction Permit CP127-2725-00001.